Space Weather Forecast

Issued on Wednesday, 13 September 2023 at 13:09 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate-class flares likely (R1-R2 radio blackouts). Slight Chance of G1 Minor storms throughout given likely coronal hole fast wind influence.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low activity, with only Common-class flares observed in the past 24 hours. The largest event was from a large sunspot region in the northwest of the disc. There are currently seven sunspot regions visible on the disc. The spot in the western hemisphere remains the largest spot on the disc, but has shown little recent development and remains magnetically simple. There are a number of other regions on the disc which are showing some magnetic complexity, but these are smaller in size. All of these regions producing some level of flare activity and add to what is a fairly active disc. The remaining regions on the disc are simpler and largely inactive. No Earth directed CMEs observed during the past 24hrs.

Solar Wind / Geomagnetic Activity: Solar winds observed were slightly elevated at first, around 400-420km/s, due to arrival of a Coronal Mass Ejection (CME), before falling erratically back to generally slow levels from around 12/1430 UTC. Solar winds have since steadily increased back up to slightly elevated, near 430-440km/s, probably due to the arrival of HSS from CH44/+. The Magnetic Field started the period at moderate to strong levels, with the arrival of the CME, before slowly declining to moderate levels as Earth entered the magnetic cloud associated with the CME, although it look likes the influence of the CME has now waned. The all important north-south component became moderately negative (southward) with the arrival of the CME and strongly negative upon entering the likely magnetic cloud, before slowly rising to more weakly negative levels.

Geomagnetic activity was at G1/minor storm levels at the start of the period, with a Kp5 observed 1200-1500 UTC, with a Kp6 (G2 moderate storm) observed in the 1500-1800 UTC interval. Thereafter, mostly Unsettled to Active (Kp3-4), but has recently returned to Quiet levels (Kp0-2) as the influence of the CME wanes.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be generally Low, with further isolated Moderate flares likely, and a slight chance of isolated Strong flares.

Solar Wind / Geomagnetic Activity: There is one Earth-directed CME in the forecast as mentioned above. This may give Earth a weak glancing blow possibly later on Day 3 (15 Sep). Recent unexpected CME influence appears to be waning with a return to a more ambient regime expected at least in the short term. Faster solar winds expected into the forecast period

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however, with some coronal hole fast wind influence expected through Day 1 into Day 2 (13-14 Sep) and an increase in winds to slightly elevated to elevated levels (450-550km/s) likely. Into Day 3 or more likely Day 4 (15-16 Sep) some connection to another fast wind stream currently near centre disk is likely. This features was perhaps the source of some strong solar winds (around 600km/s) on the last solar rotation, with a chance that winds may reach these levels by the end of the period.
This creates a complex forecast, with a variety of potential interactions, and low forecast confidence. Overall, largely Unsettled to Active (Kp3-4) geomagnetic activity is forecast, with a continuing slight chance of G1-G2 Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background with no solar radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	20	20	20	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2}	Past 24 Hours	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)

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Probability (Exceedance)	$sr^{-1} s^{-1}$)	(Yes/No)	(%)	(%)	(%)	(%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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